Abstract Submitted
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Phase Transition Enhanced Thermoelectric Performance in Copper Chalcogenides[1] DAVID BROWN, TRISTAN DAY, California Institute of Technology, KASPER BORUP, SEBASTIAN CHRISTENSEN, BO IVERSEN, Aarhus University, G. JEFFREY SNYDER, California Institute of Technology — Thermoelectric effects are characterized by the Seebeck coefficient or thermopower, which is related to the entropy associated with charge transport. For example, coupling spin entropy with the presence of charge carriers has enabled the enhancement of zT in cobalt oxides. We demonstrate that the coupling of a continuous phase transition to carrier transport in Cu_2Se over a broad (360-410 K) temperature range results in a dramatic peak in thermopower, an increase in phonon and electron scattering, and a corresponding doubling of zT (to 0.7 at 406 K), and a similar but larger increase over a wider temperature range in the zT of $Cu_{1.97}Ag_{0.03}Se$ (almost 1.0 at 400K). The use of structural entropy for enhanced thermopower could lead to new engineering approaches for thermoelectric materials with high zT and new green applications for thermoelectrics.

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